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UNITED STATES DEPARTMENT OF AGRICULTURE,  
BUREAU OF ENTOMOLOGY,  
WASHINGTON, D. C.

FOREST ENTOMOLOGY.

MEMORANDUM FOR DR. A. D. HOPKINS.

INTER-RELATIONS OF FOREST FIRES AND FOREST INSECTS.

WISTLETOW BURN  
SISEIYOU BURN

DATA FOR 1920.

J E Peterson

Ashland, Oregon  
February 7,  
1922.

MEMORANDUM FOR DR. A. D. HOPKINS  
INTERRELATIONS OF FOREST FIRES AND FOREST INSECTS  
MISTLETOE AND SISKIYOU BURNS,  
DATA FOR 1920.

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The following memorandum is the second supplementary report of investigations of forest fires as related to forest insects which have been conducted by the Ashland Station on the Mistletoe and Siskiyou burns in the Rogue River Area of southern Oregon.

The preliminary report of May 7, 1919, on this Project gave the infestation preceding and following the fires on the burned areas and in the surrounding forests, development of broods in fire injured trees and other data pertaining to the study.

The first supplementary memorandum was submitted March 21, 1921, It contained the 1919 data on the study and gave the results which had shown up to the close of the 1919 season.

The present memorandum contains the 1920 data and is submitted as an office memorandum rather than a detailed report and is intended to preserve the data in available form for use in the preparation of a final report on the Project.

As was outlined in the first supplementary memorandum it is proposed to continue the study until the 1921 data is complete and available. It is believed that there will be no object in continuing the investigations after the season of 1921 as we will then have sufficient data of the required nature to prepare a final report of the

Project.

In the following memorandum the two burns have been taken up separately as was formerly done. The data presented herewith brings the study up to the spring of 1921.

MISTLETOE BURN.

1 - Infestation Developed in 1920 on the Burned Area:

TABLE I - Trees Infested in 1920:

Yellow pine :	Class of	:	:	:	Percent of infestation:	:
	:	fire injury:	Number	:	Volume in:	in each class
(attacked by:	:	of trees:	board feet	No. trees	:	Volume
Dendroctons:	:	:	:	:	:	:
brevicomis):	Class I	:	12	:	8,560	:
	:	:	:	:	70.5%	:
	Class III	:	3	:	2,620	:
	:	:	:	:	17.5%	:
	Class IV	:	1	:	750	:
	:	:	:	:	6%	:
	Class V	:	1	:	3,750	:
	:	:	:	:	6%	:
	Total	:	17	:	15,680	:
	:	:	:	:	100%	:
Sugar pine :	All classes:	:	0	:	0	:
	:	:	:	:	0	:

TABLE II - Summary of Annual Infestations on Burned Area For Years  
1917, 1918, 1919, and 1920.

Year	Trees species	Insect	Specific Infst:		Annual Infest:	
			Trees	Volume	Trees	Volume
1917	Yellow pine	D. brevicomis	19	12,780		
		D. monticolae	1	100		
					20	12,880
1918	Yellow pine	D. brevicomis	210	150,400		
		D. monticolae	5	3,190		
		Melanophila sp.	5	980		
	Sugar pine	D. monticolae	22	15,150		
					242	159,720
1919	Yellow pine	D. brevicomis	50	41,480		
	Sugar pine	D. monticolae	1	700		
					51	42,180
1920	Yellow pine	D. brevicomis	17	15,680		
					17	15,680
Total for period					330	230,460

TABLE III - Cycle of Infestation in Burned Area:

Year of attack	No. trees	Volume	Percent of increase or decrease over preceding year. B.F	
			Increase	Decrease
1917 - Before fire	20	12,880		
1918 - After fire	242	159,720	1140%	
1919 - After fire	51	42,180		74%
1920 - After fire	17	15,680		63%
Total for period	330	230,460		

The above tables show that within the burned area the infestation during the season immediately following the fire increased 1140% in volume board feet. They also show that the infestations during the second season after the fire decreased 74% from the previous year and it further decreased 63% the third year from the total volume killed the second year. It is evident from these figures that following the heavy increase in infestation developed during the season following the fire the succeeding infestations rapidly declined and at the close of the third season, following the fire, it was only 10% of the infestation developed on the burned area as a result

of the fire. This shows a decline at the end of the third year of approximately 90%. It will also be noted that the infestations during the season of 1920 (third season following fire) amounted to 17 trees with a volume of 15,680 board feet as compared with the infestation developed during the season of 1917 (last season preceding fire) which was 20 trees with a volume of 12,880 board feet. This comparison stated in percentages show that the infestation during the 1920 season was 15% less in number of trees killed and 21% greater in volume board feet than the infestation in 1917.. It is apparent that the relative status of the 1917 and 1920 infestations were approximately equal and that the pronounced epidemic cycle of increase and decrease following the fire was of very short duration.

## 2 - Area Surrounding the Burn:

TABLE IV - The 1920 Infestations in Area Surrounding Burns:

: Unit	: D. brevicornis 1st and 2nd generations in :	
	: yellow pine :	
:	: Number trees	: Volume in board feet :
: Siskiyou	: 103	: 92,700
: Mistletoe	: 48	: 40,800
: Lambs	: 18	: 14,520
: Ashland	: 12	: 12,960
: Total	: 181	: 160,980

TABLE V - ANNUAL Infestations in Area Surrounding Burns, 1917 to 1920 Incl.

Unit	Year	Annual Infestation		Increase or decrease over preceding year in volume board ft.	
		No. trees	Volume	Increase	Decrease
Siskiyou	1917:	97	137,810:		
	1918:	128	164,450:	19%	
	1919:	87	91,750:		38%
	1920:	103	92,700:	1%	
	Totals	415	486,710:		
Mistletoe	1917:	160	93,470:		
	1918:	93	81,250:		13%
	1919:	45	37,110:		54%
	1920:	48	40,800:	10%	
	Totals	346	252,630:		
Lamb's	1917:	76	56,200:		
	1918:	52	69,150:	23%	
	1919:	46	31,550:		54%
	1920:	18	14,520:		54%
	Totals	222	171,420:		
Ashland	1917:	116	116,190:		
	1918:	205	201,280:	74%	
	1919:	46	38,800:		80%
	1920:	12	12,960:		66%
	Totals	379	369,230:		

TABLE VI - Cycle of Infestation in Area Surrounding Burns, 1917 to 1920 Incl.

Year of	Annual Infestations		Increase or decrease over preceding year in volume board feet	
	No. trees	Volume	Increase	Decrease
1917	449	403,670:		
1918	508	516,130:	28%	
1919	224	199,210:		61%
1920	181	160,980:		19%
Total	1,362	1,280,990:		

# SISKIYOU BURN.

## 1 - Infestation Developed on Burned Area in 1920:

TABLE VII - Trees Infested in 1920:

Tree and insect	Class of fire injury	No. trees	Volume	Percent in each class:	
				No. trees	Volume
Yellow pine	Class L	0	0		
(D. brevicornis)	Class III	4	3,150	100%	100%
	Class IV	0	0		
	Class V	0	0		
Sugar pine	All	0	0		
Total		4	3,150	100%	100%

TABLE VIII - Summary of Annual Infestations on Burned Area for Years 1918, 1919, and 1920.

Year	Trees species	Insect	Specific Infest.		Total annual infest.	
			No. trees	Volume	No. trees	Volume
1918	Yellow pine	D. brevicornis	40	44,030		
		D. monticolae	3	360		
	Sugar pine	D. monticolae	9	1,590		
					52	45,970
1919	Yellow pine	D. brevicornis	62	72,990		
	Sugar pine	D. monticolae	1	430		
					63	75,470
1920	Yellow pine	D. brevicornis	4	3,150		
					4	3,150
Total all species for period					119	124,590

TABLE IX - Cycle of Infestation in Burned Area:

Season of attack	Seasonal Infestation	Increase or decrease	
		No. trees	Volume
1918			
1918 1st gen. Before fire		2	260
1918 2nd gen. After fire		50	45,710
1919 Annual. After fire		63	75,470
1920 Annual. After fire		4	3,150
Total for period		119	124,590

The preceding tables show that the infestation on this burn increased, following the fire, in approximately the same degree of intensity as occurred on the Mistletoe burn and that the epidemic cycle of increase and decrease was of practically the same duration. The heavy increase which occurred immediately after the fire was followed by a rapid decline in 1920. It is significant to note that at the close of the 1920 season the infestation had declined 96% from the high point of the cycle.

## 2 - Area Surrounding Burn:

The amount of the 1920 infestation in the area surrounding the burn is given in Tables IV, V, and VI. As before stated the two burns are situated in the same infestation area and therefore data under this head is applicable alike to both burns.

## SUMMARY OF THE 1920 DATA.

The reports of May 1919 and March 1921 gave the history of the burns, the infestation preceding the fires and during the two years immediately following and other detailed matter. These phases of the study are not reviewed in this memorandum.

The present paper deals only with developments during the 1920 season. The salient features of these are:

The status of the infestation on the burned areas and in the surrounding forest during the 1920 season is easily comparable to the infestation which was developed on these areas during the season preceding the fires.

The infestation on both burns developed a pronounced high

increase on the burned areas during the first season following the fires. The infestation of the same season in the timber adjoining the burns remained at a standstill; however, in stands adjoining the latter, but more remote, there was an increase in that years infestation of approximately 25%.

During the second year following the fires there occurred a rapid decline in the infestation on both the burned areas and surrounding areas. This decline amounted to approximately 60% in volume.

During the third year following the fires (1920) this decline continued and at the close of the season the infestation amounted to 90% less than the total infestation recorded the first season after the fires on the burned areas and 70% less than the same years infestation in the surrounding areas.

The rise and decline of the infestation following the fires on both the burned areas and surrounding areas was of short duration, the cycle being completed during the three years 1918, 1919, and 1920.

The infestation over the entire area at the close of the 1920 season showed a decrease of approximately 55% less than the 1917 infestation on the area; the last seasonal infestation preceding the fires. The same relative decrease occurred in 1920 over the entire Rogue River Area and is indicative of the present trend of the infestation in the region.

The investigations to date seem to warrant the conclusions that either light or severe forest fires do cause a relatively high increase in normal infestations on burned areas and areas adjoining during the first and probably thesecond seasons following the fires but this condation is soon followed by a rapid decline which may

continue until the infestation is again normal. However, during the short epidemic period a high percentage of the stand may be killed.

That there are causes which operate to effect a high mortality in the broods of beetles developing in fire scorched trees were made known through the investigations under this project. The cause of this mortality, which effected the decrease of about 20% of the beetles emerging from those which originally attacked and entered the bark, is not thoroughly understood but has been attributed to the condition known as "sour sap" as a high percentage of the burned trees take on this condition.

These causes operate to a far less extent under normal forest conditions and therefore did not affect the development of broods in the forest surrounding the burned areas.

Respectfully submitted,

  
Entomological Ranger.

Ashland, Oregon.  
February 7, 1922.

# MAP OF MISTLETOE AND SISKIYOU BURNS - OREGON

## - LEGEND -

~~~~~ BOUNDARY OF BURNED AREAS

Map showing the 1920 infestation on burned areas and in area surrounding burns.

~~~~~ - Area Boundary  
~~~~~ - Unit Boundaries

- ① - Mistletoe Unit
- ② - Lamb's Unit
- ③ - Siskiyou Unit
- ④ - Greenspring Unit

o-D indicates yellow pine trees killed by *Pseudotsuga brevicomis* in 1920.

Red figures in circles show number of trees killed in section in which number occurs.  
o-D and number indicates trees killed in burns.

1920 (o-D) Loss.

SCALE - 2 IN. = 1 MILE

